

Answers in Finnish or English.

1. ECG work

- a. Prove that the amplitude of potential in Goldberg's augmented lead (12-lead ECG system) is 1.5 times higher than the potential in corresponding unipolar lead. Be specific. (2 points)
- b. Explain in details the basic reasons and principles for vectorcardiographic (VCG) measurement. (4 points)

2. EEG work

- a. Electrode impedances are important in recording EEG. Why is this? (3 points)
- b. If you are to record VEPs in poor measurement setting having large noise level, what can you do to improve i) the recording situation and ii) the analysis of VEP data? (3 points)

3. Nerve impulse velocity work

- a. You are stimulating i) a single neuron or ii) a bundle of neurons. In these two cases what are the effects of the stimulation amplitude on the response strength and impulse velocity? What are the differences between the cases and why? (3 points)
- b. If the velocity would be calculated as distance/time between **one** stimulation location and the response location, would the velocity be accurate? Give reasons for your answer. (time = time between stimulus and response ; distance = distance between stimulus and response locations) (1.5 points)

What is the effect of using **two** stimulation locations, e.g.: upper arm, and lower arm, and using the formula $\Delta \text{distance} / \Delta \text{time}$, on the accuracy of the calculated velocity? ($\Delta \text{distance}$ = distance between the two stimulation locations, Δtime = difference of the observed conduction time for the two stimulation locations) (1.5 points)

4. Respiratory work

- a) What do you mean by Lung Compliance (CL), the factors that determine CL, and what information do we get by calculating CL. (2 points)
- b) Define obstructive and restrictive lung disease? How they affect Forced vital capacity (FVC), Forced expiratory volume in 1 second (FEV1), FEV1/FVC ratio and Total lung capacity (TLC)? (4 points)

